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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/897,608	07/03/2001	Cary Lee Bates	ROC920010076US1-IBM	9648
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Robert H. Berdo, Jr. RABIN & CHAMPAGNE, P.C. Suite 500 1101 14th Street, N.W. Washington, DC 20005			EXAMINER NAHAR, QAMRUN	
			ART UNIT	PAPER NUMBER
			2124	
DATE MAILED: 06/23/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/897,608	Applicant(s) BATES ET AL.	
	Examiner Qamrun Nahar	Art Unit 2124	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2001.
 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-66 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 1-66 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☒ The drawing(s) filed on 03 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-66 have been examined.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-66 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 1 recites the limitation "a pre-ICB program position" on line 5 of the claim. This limitation is indefinite because pre-ICB is not defined in the claim. Therefore, this limitation is interpreted as "a pre-initial conditional breakpoint program position".

Claims 2-11 are rejected for dependency upon rejected base claim 1.

5. Claim 12 recites the limitation "a pre-ICB program position" on line 6 of the claim. This limitation is indefinite because pre-ICB is not defined in the claim. Therefore, this limitation is interpreted as "a pre-initial conditional breakpoint program position".

Claims 13-22 are rejected for dependency upon rejected base claim 12.

6. Claim 23 recites the limitation "a pre-ICB program position" on line 8 of the claim. This limitation is indefinite because pre-ICB is not defined in the claim. Therefore, this limitation is interpreted as "a pre-initial conditional breakpoint program position".

Claims 24-33 are rejected for dependency upon rejected base claim 23.

7. Claim 34 recites the limitation "a pre-ICB program position" on line 4 of the claim. This limitation is indefinite because pre-ICB is not defined in the claim. Therefore, this limitation is interpreted as "a pre-initial conditional breakpoint program position".

Claims 35-44 are rejected for dependency upon rejected base claim 34.

8. Claim 45 recites the limitation "a pre-ICB program position" on line 5 of the claim. This limitation is indefinite because pre-ICB is not defined in the claim. Therefore, this limitation is interpreted as "a pre-initial conditional breakpoint program position".

Claims 46-55 are rejected for dependency upon rejected base claim 45.

9. Claim 56 recites the limitation "a pre-ICB program position" on line 7 of the claim. This limitation is indefinite because pre-ICB is not defined in the claim. Therefore, this limitation is interpreted as "a pre-initial conditional breakpoint program position".

Claims 57-66 are rejected for dependency upon rejected base claim 56.

Claim Rejections - 35 USC § 101

10. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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11. Claims 1-11 and 34-44 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

As per claims 1 and 34, merely claimed as a program representing a computer listing *per se* (a program debugger), that is, descriptions or expressions of such a program and that is, descriptive material *per se*, non-functional descriptive material, and is not statutory because it is not a physical "thing" nor a statutory process, as there are not "acts" being performed. Such claimed programs do not define any structural and functional interrelationships between the program and other claimed aspects of the invention which permit the program's functionality to be realized. Since a computer program is merely a set of instructions capable of being executed by a computer, the program itself is not a process, without the computer-readable medium needed to realize the program's functionality. In contrast, a claimed computer-readable medium encoded with a program defines structural and functional interrelationships between the program and the medium which permit the program's functionality to be realized, and is thus statutory. **Warmerdam**, 33 F.3d at 1361, 31 USPQ2d at 1760. **In re Sarkar**, 588 F.2d 1330, 1333, 200 USPQ 132, 137 (CCPA 1978). See MPEP § 2106(IV)(B)(1)(a).

As per claims 2-11 and 35-44, these claims are rejected for dependency on the above rejected non-statutory claims 1 and 34, respectively.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-2, 7, 12-13, 18, 23-24, 29, 34-35, 40, 45-46, 51, 56-57 and 62 are rejected under 35 U.S.C. 102(b) as being anticipated by Wahbe et al., "Practical Data Breakpoints: Design and Implementation", 1993, ACM (hereinafter Wahbe).

Per Claim 1 (as best understood):

The Wahbe publication discloses:

- **a program debugger, for use in a programming environment** ("In this paper, we present the design and implementation of a practical data breakpoint facility. ... A data breakpoint facility must monitor all memory updates performed by the program being debugged." in abstract)
- **means for extracting, from an initial conditional breakpoint within a program loop, a first Boolean expression that is at least partially invariant within the loop** ("First, the optimizer detects all loop invariant target addresses." on pg. 8, 2nd column, par. 4, lines 3-4)
- **means for removing said initial conditional breakpoint; means for setting, at a pre-initial conditional breakpoint program position, a special conditional breakpoint that includes said first Boolean expression, and means for reestablishing said initial conditional breakpoint if said special conditional breakpoint is satisfied** ("It eliminates the checks for these loop invariants addresses and replaces them with write checks in a pre-header block that

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dominates all entrances to the loop. If one of these checks succeeds at runtime, the MRS will insert the eliminated write check within the loop.” on pg. 8, 2nd column, par. 4, lines 4-9).

Per Claim 2 (as best understood):

The Wahbe publication discloses:

- wherein said first Boolean expression is completely invariant within the loop (pg. 8, 2nd column, par. 4, lines 3-4).

Per Claim 7 (as best understood):

The Wahbe publication discloses:

- means for extracting, from program code within the loop, a second Boolean expression that is invariant within the loop, wherein said special conditional breakpoint disjunctively includes the complement of said second Boolean expression, and said first Boolean expression is invariant within the loop when said second Boolean expression is satisfied (pg. 9, 2nd column, par. 4, lines 1-8 to pg. 10, 1st column, par. 1, lines 1-5; and pg. 10, 1st column, par. 2, lines 1-9).

Per Claims 12-13 & 18 (as best understood):

These are method versions of the claimed program debugger discussed above (claims 1-2 & 7, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Wahbe.

Per Claims 23-24 & 29 (as best understood):

These are article of manufacture versions of the claimed program debugger discussed above (claims 1-2 & 7, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Wahbe.

Per Claim 34 (as best understood):

The Wahbe publication discloses:

- **a program debugger, for use in a programming environment** (“In this paper, we present the design and implementation of a practical data breakpoint facility. ... A data breakpoint facility must monitor all memory updates performed by the program being debugged.” in abstract)
- **means for extracting, from an initial conditional breakpoint within a program loop, a first Boolean expression that is at least partially invariant within the loop** (“First, the optimizer detects all loop invariant target addresses.” on pg. 8, 2nd column, par. 4, lines 3-4)

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- means for setting, at a pre-initial conditional breakpoint program position, a special conditional breakpoint that includes the complement of said first Boolean expression; and means for removing said initial conditional breakpoint if said special conditional breakpoint is satisfied ("It eliminates the checks for these loop invariants addresses and replaces them with write checks in a pre-header block that dominates all entrances to the loop. If one of these checks succeeds at runtime, the MRS will insert the eliminated write check within the loop." on pg. 8, 2nd column, par. 4, lines 4-9; pg. 9, 2nd column, par. 4, lines 1-8 to pg. 10, 1st column, par. 1, lines 1-5; and pg. 10, 1st column, par. 2, lines 1-9).

Per Claim 35 (as best understood):

The Wahbe publication discloses:

- wherein said first Boolean expression is completely invariant within the loop (pg. 8, 2nd column, par. 4, lines 3-4).

Per Claim 40 (as best understood):

The Wahbe publication discloses:

- means for extracting, from program code within the loop, a second Boolean expression that is invariant within the loop, wherein said special conditional breakpoint conjunctively includes said second Boolean expression, and said first Boolean expression is invariant

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within the loop when said second Boolean expression is satisfied (pg. 9, 2nd column, par. 4, lines 1-8 to pg. 10, 1st column, par. 1, lines 1-5; and pg. 10, 1st column, par. 2, lines 1-9).

Per Claims 45-46 & 51 (as best understood):

These are method versions of the claimed program debugger discussed above (claims 34-35 & 40, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Wahbe.

Per Claims 56-57 & 62 (as best understood):

These are article of manufacture versions of the claimed program debugger discussed above (claims 34-35 & 40, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also anticipated by Wahbe.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 3-6, 8-11, 14-17, 19-22, 25-28, 30-33, 36-39, 41-44, 47-50, 52-55, 58-61 and 63-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wahbe et al., "Practical Data

Breakpoints: Design and Implementation", 1993, ACM (hereinafter Wahbe) in view of Muthukumar (U.S. 6,571,385).

Per Claim 3 (as best understood):

The rejection of claim 1 is incorporated, and further, Wahbe does not explicitly teach means for setting, at a first loop exit program position, a first reset breakpoint, and means for removing said initial conditional breakpoint if said first reset breakpoint is satisfied.

Muthukumar teaches means for setting, at a first loop exit program position, a first reset breakpoint, and means for removing said initial conditional breakpoint if said first reset breakpoint is satisfied (column 1, lines 33-40).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the program debugger disclosed by Wahbe to include means for setting, at a first loop exit program position, a first reset breakpoint, and means for removing said initial conditional breakpoint if said first reset breakpoint is satisfied using the teaching of Muthukumar. The modification would be obvious because one of ordinary skill in the art would be motivated to efficiently handle loops with one or more exits.

Per Claim 4 (as best understood):

The rejection of claim 3 is incorporated, and Muthukumar further teaches means for removing said first reset breakpoint if said first reset breakpoint is satisfied (column 2, lines 49-61).

Per Claim 5 (as best understood):

The rejection of claim 3 is incorporated, and Muthukumar further teaches means for setting, at a second loop exit program position, a second reset breakpoint; and means for removing said initial conditional breakpoint if one of said first and second reset breakpoints is satisfied (column 2, lines 49-61).

Per Claim 6 (as best understood):

The rejection of claim 5 is incorporated, and Muthukumar further teaches means for removing said first and second reset breakpoints if one of said first and second reset breakpoints is satisfied (column 2, lines 49-61).

Per Claims 8-11 (as best understood):

These are another versions of the claimed program debugger discussed above (claims 3-6, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 14-17 (as best understood):

These are method versions of the claimed program debugger discussed above (claims 3-6, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 19-22 (as best understood):

These are method versions of the claimed program debugger discussed above (claims 8-11, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 25-28 (as best understood):

These are article of manufacture versions of the claimed program debugger discussed above (claims 3-6, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 30-33 (as best understood):

These are article of manufacture versions of the claimed program debugger discussed above (claims 8-11, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claim 36 (as best understood):

The rejection of claim 34 is incorporated, and further, Wahbe does not explicitly teach means for setting, at a first loop exit program position, a first reset breakpoint, and means for reestablishing said initial conditional breakpoint if said first reset breakpoint is satisfied. Muthukumar teaches means for setting, at a first loop exit program position, a first reset breakpoint, and means for reestablishing said initial conditional breakpoint if said first reset breakpoint is satisfied (column 1, lines 33-40).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the program debugger disclosed by Wahbe to include means for setting, at a first loop exit program position, a first reset breakpoint, and means for reestablishing said initial conditional breakpoint if said first reset breakpoint is satisfied using the teaching of Muthukumar. The modification would be obvious because one of ordinary skill in the art would be motivated to efficiently handle loops with one or more exits.

Per Claim 37 (as best understood):

The rejection of claim 36 is incorporated, and Muthukumar further teaches means for removing said first reset breakpoint if said first reset breakpoint is satisfied (column 2, lines 49-61).

Per Claim 38 (as best understood):

The rejection of claim 36 is incorporated, and Muthukumar further teaches means for setting, at a second loop exit program position, a second reset breakpoint; and means for reestablishing said initial conditional breakpoint if one of said first and second reset breakpoints is satisfied (column 2, lines 49-61).

Per Claim 39 (as best understood):

The rejection of claim 38 is incorporated, and Muthukumar further teaches means for removing said first and second reset breakpoints if one of said first and second reset breakpoints is satisfied (column 2, lines 49-61).

Per Claims 41-44 (as best understood):

These are another versions of the claimed program debugger discussed above (claims 36-39, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 47-50 (as best understood):

These are method versions of the claimed program debugger discussed above (claims 36-39, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 52-55 (as best understood):

These are method versions of the claimed program debugger discussed above (claims 41-44, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 58-61 (as best understood):

These are article of manufacture versions of the claimed program debugger discussed above (claims 36-39, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claims 63-66 (as best understood):

These are article of manufacture versions of the claimed program debugger discussed above (claims 41-44, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Conclusion

16. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (703) 305-7699. The examiner can normally be reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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QN

June 15, 2004



ANIL KHATRI
PRIMARY EXAMINER